

**INTERACTIVE TV CONTEXTUAL CONTENT SURFING USING INTER-CHANNEL
HYPERLINKING: SYSTEMS, METHODS & PROGRAM PRODUCTS**

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RELATED APPLICATION

Co-pending application entitled "Interactive TV Audience Estimation and Program Rating for Real-Time Using Multi Level Tracking Methods, Systems and Program Products" (SOM9-2000-0013) by James S. Lipscomb, Lurng-Kuo Liu and Liang-Jie Zhang, Serial Number 10 _____, filed December 28, 2000, assigned to the same assignee as that of the present invention and fully incorporated herein by reference.

BACKGROUND OF INVENTION

1. Field of Invention

This invention relates to Interactive Television systems, methods and program products.

15 More particularly the invention relates to Interactive TV contextual content surfing using inter-channel hyperlinking systems, methods & program products.

2. Description of Prior Art

As a result of the steady progress in digital transmission and compression technology, the combination of these two technologies exhibit a powerful synergy in providing new communication paradigms for TV. Digital transmission is extensively used as an information transmission means and more and more TV channels can be fitted into a broadcast pipe for broadcasting. Therefore, it becomes desirable to provide a mechanism to TV viewers for simplifying TV-channel surfing based on the TV viewers' interest. What is needed in the art is a generalized framework for delivering content-sensitive hyperlinking information to TV viewers.

25 Prior art related to interactive television includes:

USP 5,617,565 issued April 1, 1997 discloses a procedure for selecting and storing data elements communicated from a common database to viewers of the database utilizing a communication link between each transmitter and a concomitant receiver accessible by the viewer. The transmitted information is augmented with attributes, which are used at the receiver

5 to select and then store locally only that information of interest to each receiver's viewer, wherein the attributes and the viewer selection pattern determine the criteria for storing information locally. Attributes include: utility of each data element in time; interest categories and level of interest for each of the categories determined for the collective viewers; repeat time to the data element; and a hyperlink to associated data elements.

10 USP 5,982,445 discloses textual and graphical displays provided on a television screen using a hypertext markup language (HTML). On-screen display devices allow a viewer to invoke hyperlinks to different pages of HTML-coded data in addition to function calls for controlling television and non-television appliance functions. A method provides HTML-coded display data, which is processed to provide a signal suitable for reproduction on a television. The display data

15 may provide information on a featured movie or other presentation of an associated video programming service signal such as a network television broadcast. Function calls allow the control of various television functions and programming options, such as the purchase of pay-per-view programming, or television display options such as aspect ratio, channel, brightness, picture-in-picture, or split-screen. Non-television appliances, which may be controlled with

20 function calls, include audio equipment which is associated with the programming service (e.g., surround sound, filtering) in addition to, for instance, a home heating and air conditioning system or other household appliances. The invention allows a designer to adapt the vast HTML

resources of the Internet for use in the television environment for entertainment, educational or informational purposes.

USP 6, 025,837 disclose an interactive entertainment system including a program provider, which distributes video content programs to multiple subscribers over a distribution network. Each subscriber has a viewer interface unit, which receives the digital video program and converts it for display on a television, monitor, or other display unit. The viewer interface unit has a processor and memory. An electronic programming guide (EPG) resides in the memory and is executable on the processor to organize programming information that is descriptive of the programs supplied over the interactive entertainment system. The EPG supports a viewer interface (UI), which visually correlates programs titles to scheduled viewing times. A hyperlink browser also resides in memory and is executable on the processor. One or more hyperlinks, which reference target resources containing interactive content related to the video programs, are integrated as part of the EPG UI. The hyperlinks can be placed in the program tiles, channel tiles, or description area, and can be situated alone or embedded within other text. When a viewer activates a hyperlink within the EPG, the viewer interface unit launches the browser to activate the target resource specified by the hyperlink. The data retrieved from the target resource is then displayed on the display unit. The viewer can also drag a particular program or channel label from its location within the EPG UI and drop the label at another location on the display unit. This drag-and-drop operation associates an instruction with the label that will execute in response to activation of the label. The instruction might cause the visual display unit to tune to the program or channel represented by the particular label, or to initiate procedures to record the program when it begins playing, or to jump to a related target resource, such as a Web site.

Other prior art includes web sites, as follows:

Obvious Technologies at world wide web site Obvious.Com, which plays web video in a web browser.

Veon at world wide site Veon.Com, which has menus and floating links to web

5 information. Videotechnologies at world wide web site Videotechnologies. Com.

None of the prior art discloses or suggests an interactive TV contextual content surfing using hyperlinking, which allows viewers to have the option to surf only TV channels related to their current interest, and where hyperlinks are developed from the general, overall classification of the entire video.

SUMMARY OF THE INVENTION

An object of the invention is interactive TV contextual content surfing methods, systems and program products using inter-channel hyperlinking.

Another object is interactive TV contextual content surfing methods, systems and program products providing alternative embodiments of inter channel hyperlinking.

Another object is a content creation station generating and transmitting interactive TV programs including program classification information for interactive TV contextual surfing.

Another object is a broadcast station for broadcasting interactive program information and classification information in a streaming data format for interactive TV contextual surfing.

Another object is a broadcast server for processing program classifications in related categories for interactive TV contextual surfing.

Another object is a broadcast server for hyperlinking program information in related categories for interactive TV contextual surfing.

Another object is broadcasting program information and classification information in separate channels to receivers for interactive TV contextual surfing.

Another object is a receiver for receiving and storing TV broadcasts in classification categories for interactive TV contextual surfing.

- 5 These and other objects, features and advantages are achieved in a TV broadcast station, which receives interactive TV Program Content generated by Creators. The Content is categorized by the Creator including title, producer, director, type of program (e.g., sports), sub-type of program (e.g., football), director/producer, players/actors, etc. The Content is provided to the broadcast station in the MPEG or web-streaming video/audio formats. Program classification categories are delivered to the broadcast station via an Internet connection. A broadcast server equipped with a correspondence table stores a dynamic table of correspondence between TV program categories and TV channel numbers. Hyperlinking information is created by the broadcast server. The hyperlinking information contains a list of channels that broadcast the same nature of programs by referencing the correspondence table. The server broadcasts the hyperlinking information to that list of channels. The broadcast network carries the TV programs and associated classification information in separate channels to the local TV station for retransmission to TV devices including settop boxes. The Internet may serve as one of the channels for providing the program classification information and receiving viewer input.
- 10 Alternatively, the broadcast network may send the program information and associated classification information directly to the TV set top box. The set-top box processes the broadcast hyperlinking information and displays it on the TV screen. The set-top box stores program information by categories in classification tables, contents of a TV program guide section, and recorded programs. A viewer interacts with the set-top box to select a category of programs from
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the Classification tables. From time-to-time the viewer may select a new program to watch or may ask to hyperlink to a new program related to the one being watched. In the event of a hyperlink from one program to another, the system may choose either to go directly to the new program or it may let the viewer choose among the various ways the program was classified,
5 provided that one or more programs is available. Otherwise, the offer to hyperlink is not sensitive to selection. Once the classification is chosen, there will be at least one program to go to. If there are several programs to choose from, the system may select one or the viewer may be allowed to select one. The viewer may then accept the program as chosen, which need involve no explicit viewer interaction.

10 **DESCRIPTION OF THE DRAWING**

The invention will be further understood from the following detailed description of a preferred embodiment taken in conjunction with an appended drawing, in which:

Figure 1 is a system diagram of an interactive TV contextual content surfing system using inter-channel hyperlinking and incorporating the principles of the present invention.

Figure 2 is an overall flow of data for direct channel hyperlinking in the system of Figure 1.

Figure 3 is one embodiment of data layout for direct channel hyperlinking in the system of Figure 1.

Figure 4 is a flow diagram for direct channel hyperlinking in the system of Figure 1.

20 Figures 5 and 5A are flow diagrams describing alternative embodiments for the hyperlinking shown in Figure 4.

DESCRIPTION OF PREFERRED EMBODIMENT

Briefly, before describing the preferred embodiment, an overview of the system is presented to aid in a better understanding of the invention. An interactive TV contextual content surfing system allows TV viewers to have the option to surf directly to TV channels that are

5 related to their current interest without necessarily a separate step to access the program guide.

Of course, the system will not prevent TV viewers from selecting other categories of program if they choose to do so. The interactive TV contextual content surfing system is composed of a plurality of TV devices connected through a broadcast network, and a broadcast server through which TV programs and additional data are delivered to TV devices. The TV device is equipped

10 with viewer interfaces capable of taking a viewer's input and responding to it, and a means to recognize and process the additional data that it receives from the broadcast network. To achieve the above object, the interactive TV contextual content surfing system is characterized in that: the broadcast server is equipped with a correspondence table storing means for storing a dynamic table of correspondence between TV program category and TV channels number. The broadcast server creates hyperlinking information, which contains a list of channels that are broadcasting the same nature of program by referencing the correspondence table, and broadcasts the hyperlinking information to that list of channels. The TV device, upon successfully processing the broadcast hyperlinking information displays it on the TV screen, takes the viewers' input and surfs among the channels specified in the hyperlinking information.

15 In one embodiment a generalized framework is provided for delivering content-sensitive hyperlinking information to TV viewers. TV programs are categorized at network operators' headend based on the program's nature and show time. For each category at a given time,

hyperlinking information, which contains a list of channels that are broadcast in the same category of program is created and broadcast as supplemental data in that channel.

In another embodiment, information about program categories is broadcast to the settop box on an auxiliary channel not being displayed. Besides grouping programs in categories at the headend, the settop box itself may group programs based on information directly from the TV viewer or by deduction based on TV view habits as with other vendors products. These groupings may also be displayed on the channel being viewed.

In another embodiment, when a recorded program has stored with it the information that classifies it the viewer can after selecting the program or while watching it surf to other related programs broadcast at that time, stored, or scheduled (in which case the viewer goes to a play/record dialog for the future program).

In still another embodiment while looking over scheduled programs in a program guide the viewer may surf to other related programs playing at the time, recorded, or scheduled (in which case the viewer goes to a play/record dialog for the future program).

Turning to Figure 1, an interactive TV contextual content surfing system 100 includes an Interactive TV content creation station 102 linked to a TV broadcasting station 104 by cable or like and to a Web server 106 and global tracking server 107 by a network 108. The content creator install "hot spots" in the content for hyperlinking to other content. The process of installing "hot spots" and hyperlinking is well known in the art and is described for example in USP 5,841,978 entitled "Networking Using Steganographically Embedded Data Objects" issued November 24, 1998 and USP 5,918,012 entitled "Hyper Linking Time Based Data" issued January 29, 1999. The broadcasting station 104 is further linked to a broadcast network 112, serving a plurality of local TV stations 115 including a local tracking server 117 linked to the

networks 112 and 108, respectively implementing an Interactive TV Tracking architecture of the present invention. The station 115 serves a plurality of local receivers, each including a TV set 120 having a TV screen 122, a set-top box 124, a remote control device 126 and communications circuitry (not shown). The TV screen is coupled to the set-top box. The set-top box is capable of 5 processing broadcast hyperlinking information and transmitting to the TV screen for display. The communications circuitry is capable of coupling the set-top box to the remote broadcast server via the broadcast network. The system incorporates the following features:

1. A viewer can hyperlink from a program being viewed to a related program.
2. A viewer can hyperlink from a scheduled or recorded program to a related program.
3. Where a related program may be in progress, previously recorded, or scheduled or broadcast in the future, the viewer can hyperlink to a recording dialog.
4. Hyperlinking information is downloaded as supplemental data in an active channel showing or on an auxiliary channel not being displayed.
5. A settop box itself may group programs by deduction based on viewer TV habits or based on information directly from the TV viewer.

Figure 2 taken in conjunction with Figure 1 shows an overall interactive TV data flow process 200. In step 201, interactive TV program content is created in station 102 by a creator. The program content is in the MPEG or web-streaming video and audio format. The programs 20 are classified by categories, including title, producer, director, type of program (e.g. sports), subtype of program (e.g. football), director, producer, players, actors, etc. The classifications associated with each program are delivered as data embedded in an MPEG-2 stream, on a separate channel 103 over an IP Internet connection, etc. Program classification categories are

delivered to the broadcast station via an Internet connection 108. A broadcast server in the station is equipped with a correspondence table stores a dynamic table of correspondence between TV program categories and TV channel numbers. Hyperlinking information is created by the broadcast server. The hyperlinking information contains a list of channels that broadcast 5 the same nature of programs by referencing the correspondence table. The server broadcasts the hyperlinking information to that list of channels. The broadcast network carries the TV programs and associated classification information in separate channels to the local TV station for retransmission to TV devices including settop boxes. The Internet may serve as one of the channel for providing the program classification information and receiving viewer input.

10 Alternatively, the broadcast network may send the program information and associated classification information directly to the TV set top box. In step 203, the TV Broadcast Station 104 provides both the audio/video content and the program classifications again, either together or over separate channels to the Broadcast Network 112. In step 205, the Broadcast network provides this and other programs and classifications to the Local TV System 115 for 15 redistribution to the viewer's Set Top Box 124, or the broadcast network sends the information directly to the viewer's Set Top Box. The information and programs are processed, as will be described hereinafter, and then are displayed on the viewer's TV Set 120, which the viewer sees and interacts with through the set top box 114 and/or remote control 126.

Figure 3 in conjunction with Fig. 1 shows one embodiment of a data layout 300 for direct 20 channel hyperlinking. The Broadcast Network 112 or the Local TV System 115 send TV programs and associated classification information, possibly with schedule information on request through a separate channel or automatically to the Set Top Box 124. The Set Top Box displays the information on the display 122 for the TV Set 120 and receives interactions 303

from the viewer viewing the TV. The viewer is watching a program. The program while it is being viewed may be stored on local storage 305, or it may simply be a TV Program Guide entry 306, in which case watching the program means viewing the Guide entry. Channels being broadcast to the Set Top Box have classification information stored in a Classification Table 307 5 in the Set Top Box. Classification information consists of categories of program content and, names of other specific related TV programs, all of which are referred to as categories. Programs stored locally for later viewing have their classification information stored in a Classification Table 308. Programs listed in the TV Program Guide have their classification information stored in a Classification Table 309. These tables may be separate as shown or may 10 be combined with other tables or media. These tables may also be resident on the Local TV System and accessed through the Set Top Box or TV.

Figure 4 in conjunction with Figs 1 and 3 shows a method 400 for direct channel hyperlinking using the data storage in Figure 3 In step 401, the Set Top Box 124 is turned on and the viewer selects a program to watch in step 402. From time to time in step 403 the viewer may select a new program to watch or may ask to hyperlink to a new program related to the one being watched. In step 404 a hyperlink selection is activated by a viewer using the remote control 126 to “click on” on a hot spot in the image displayed on the TV screen 122. The system may choose or let the viewer choose among the various ways the program was classified, linking for example 15 to another Sports program or another Football program or to another program that includes an actor in the previous program, provided that one or more programs are available, otherwise the offer to hyperlink is not sensitive to selection. Once the classification is chosen there will be at least one program to view. In step 405, if there are several programs to choose from, the system 20 may select one or the viewer may be allowed to select one. In step 406, the viewer may then

accept the program as chosen, which need involve no explicit viewer interaction. Alternatively, in step 407 the viewer may cancel the selected program and go back to the previous program that started the interaction, or the viewer may ask to try again selecting manually or letting the system select automatically a new category and program related to the previous program.

5 Figures 5 and 5A provide alternative embodiments of program hyper linking described in Figure 4 at steps 403 – 407. Figure 5 will be described in conjunction with Figure 3 and 4. In describing Figs 5 and 5A, the term system is intended to mean programming stored at the TV broadcast station 104 and/or the local TV station 115 interacting with the set-top box 124 responsive to the remote control unit 122 (See Fig. 1) The system 100 first presents hyperlinks to

10 new programs related to the one being watched in a process 500. In step 501 the process starts automatically or on request as previously described in Figure 3. In step 502 the system queries the settop box hardware or software to determine which program is presently being viewed by the viewer. Step 503 stores the viewing state as state X, a state to which the viewer may choose to return to by canceling the coming interactions. Depending on the viewing state, one of four actions takes place. First, in step 504 the viewer is receiving and viewing a broadcast program.

15 The channel number is obtained from the settop box, and the program entry for that channel in Classification Table 1 (307) is read to obtain the categories from Classification table 307 (See Fig. 3) in which that program is classified. The list of categories is stored in the system in step 510 for subsequent processing to be described in Figure 5A. Second, in step 505 pre-recorded

20 program played from onboard memory are being viewed by the viewer. The name of the viewed program is obtained from the settop box software that started the play and the entry for that program is read in Classification Table 3 (308) to obtain the categories in which that program is classified. The list of categories is stored in the system in step 510 for subsequent processing to

be described in Figure 5A. Third, in step 506 a list of programs stored locally (305), in effect a local electronic-program-guide (EPG) is being viewed except that the play time of any program is whenever the viewer wishes to play the program from local storage. The name of the program the viewer selects is obtained from the settop box software that stored the program in local

5 storage, and the entry for that program in Classification Table 3 (308) is read in step 507 to obtain the categories in which that program is classified. The list of categories is stored in the system in step 510 for subsequent processing to be described in Figure 5A. Fourth, in step 508 a list of programs in the local TV system's electronic-program-guide (EPG) is being viewed. The name of the program the viewer selects is obtained by interaction back to the local TV system or

10 by local storage of these program names in the settop box, and the entry for that program is read in step 509 to obtain in Classification Table 2 (309) the categories in which that program is classified. The list of categories is stored in the system in step 510 for subsequent processing to be described in Figure 5A.

Turning to Figure 5A, processing of the list of categories of some viewer-selected program stored in step 510 is initiated in step 601. In step 602 the system state is saved as state Y to which the system will return if the user is unhappy with the hyperlink to a related program and wishes to try another related program. In step 603 each category in which the selected TV program is classified is processed. Recall that these "categories" can be both abstract types of programs or the names of specific related programs. In step 604 either the system finds the name

20 of a specific program or the category of the selected program is compared to the categories of all programs in Classification Tables 1-3 and selects only one program that shares that category. The name of this program is displayed for the viewer to select and the process returns to step 603 to consider the next category of the specified program. In step 605 the system compares the

category of the selected program to the categories of all programs in Classification Tables 1-3 and selects one more program that shares that category. The name of that category is displayed for the viewer to select. In step 606 the system either selects one of the above alternatives automatically, in which case the display of the selections may be omitted, or allows the user to

5 select an alternative with the remote control. On the remote control occasion, the user selects a related program by a direct hyperlink in the program title and processing of the selection proceeds in step 608. If however in step 607 the viewer selects not a program but a displayed abstract category, then a final list of program names is obtained and the system then either automatically selects one or displays a list of program names for the user to select from. In step

10 608 the viewer has committed to leave the old selected program or EPG display and wishes to view the new selected program, the one the viewer wants to view next. Thus, in step 608 that new selected program starts to display, assuming it is being broadcast or that it is available in local stored memory, or else it a program to be broadcast in the future, in which case the system presents a standard dialog to ask the viewer if the selected program should be recorded at that

15 time for later viewing or displayed immediately upon broadcast. In step 609 the viewer is optionally presented a dialog to approve the selection. The system may automatically accept the situation and continue to show the program or recording dialog (step 610), or the user may with the remote control select that option presented on the display screen. The system may present also the option to cancel the selection in which case in step 611 the system reverts to state X,

20 saved in step 503 before the new program selection was done. In either case the system proceeds to step 403 (Figure 4) to wait for the next viewer interaction. The system in step 609 may also present the option to retry finding a related program. If the user selects the option with the remote control 126 (Fig. 1), then in step 612 the system reverts to state Y saved in step 602,

which is in preparation for selecting a new related program. Upon proceeding to step 603 a new program is selected automatically by the system or with the help of viewer selection of alternatives. The process 500 repeats as needed.

While the invention has been described in terms of a preferred embodiment, various
5 changes can be made therein without departing from the spirit and scope of the invention as defined in the appended claims, in which:

We Claim,